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(71) Applicant Cooperative Condensfabriek "Friesland", Pieter Stuyvesantweg 1, Postbox 226, 8901 MA Leeuwarden, Netherlands
(72) Inventor Sjoerd Hogerhuis
(74) Agent George Fuery & Company

(54) Beverage Dispenser

(57) Apparatus for automatically delivering measured quantities of beverages, each quantity being prepared just before delivering it, said apparatus having at least a water cooler (3) and at least one delivery line consisting of a valve, mixer (7, 12) and cup holder (10), a quantity measuring device for powdered ingredient connectable to the mixer, the improvement being that a dispensing means for cleaning and disinfecting liquid is automatically connectable at a predetermined sequence of periods to each delivery line, preferably a regulating valve regulating the presence of said liquid in said mixer.

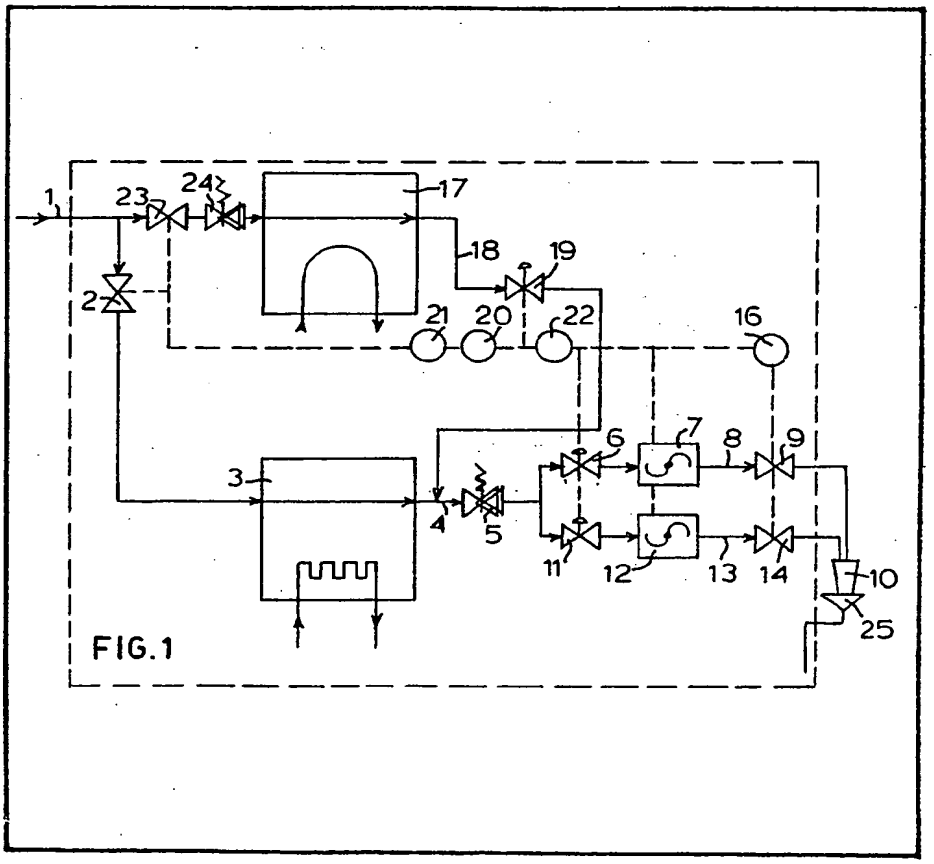

FIG.1

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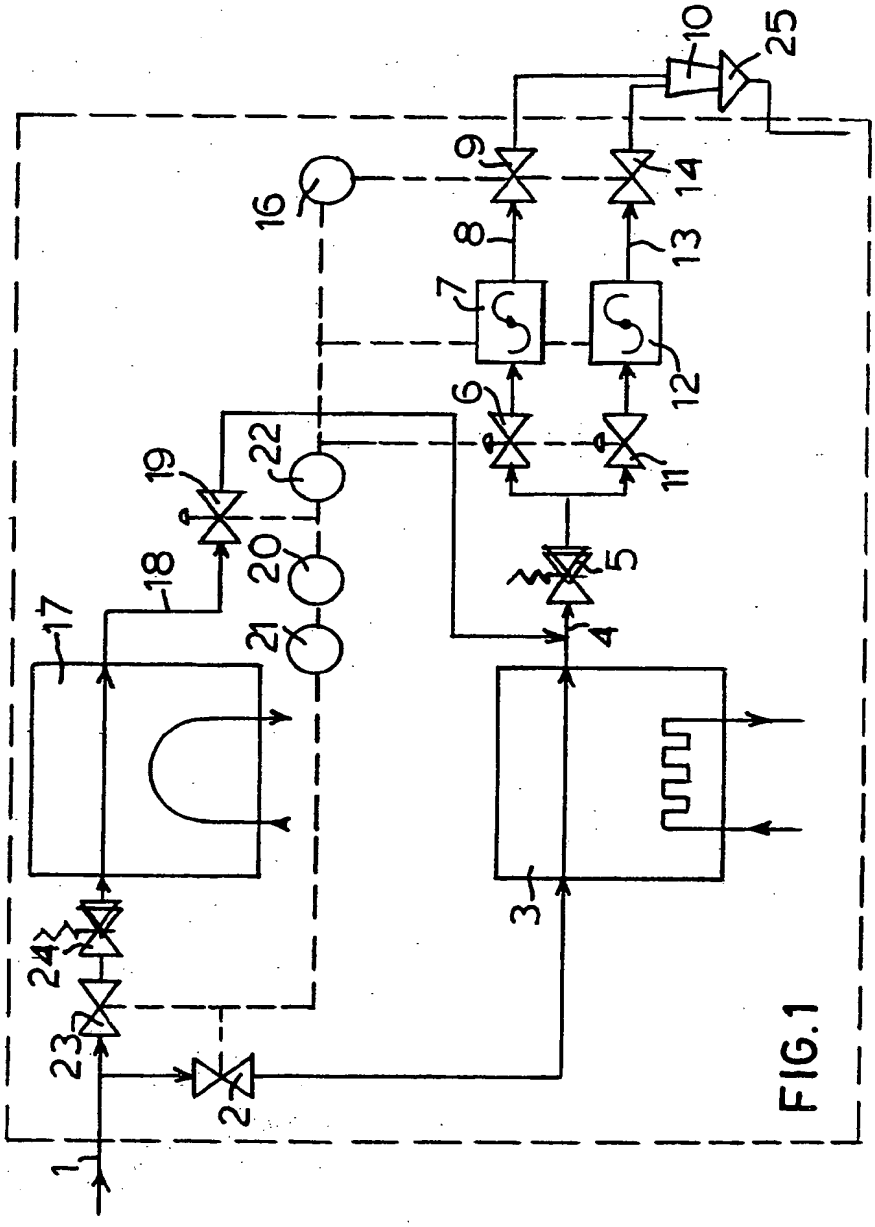

FIG.1

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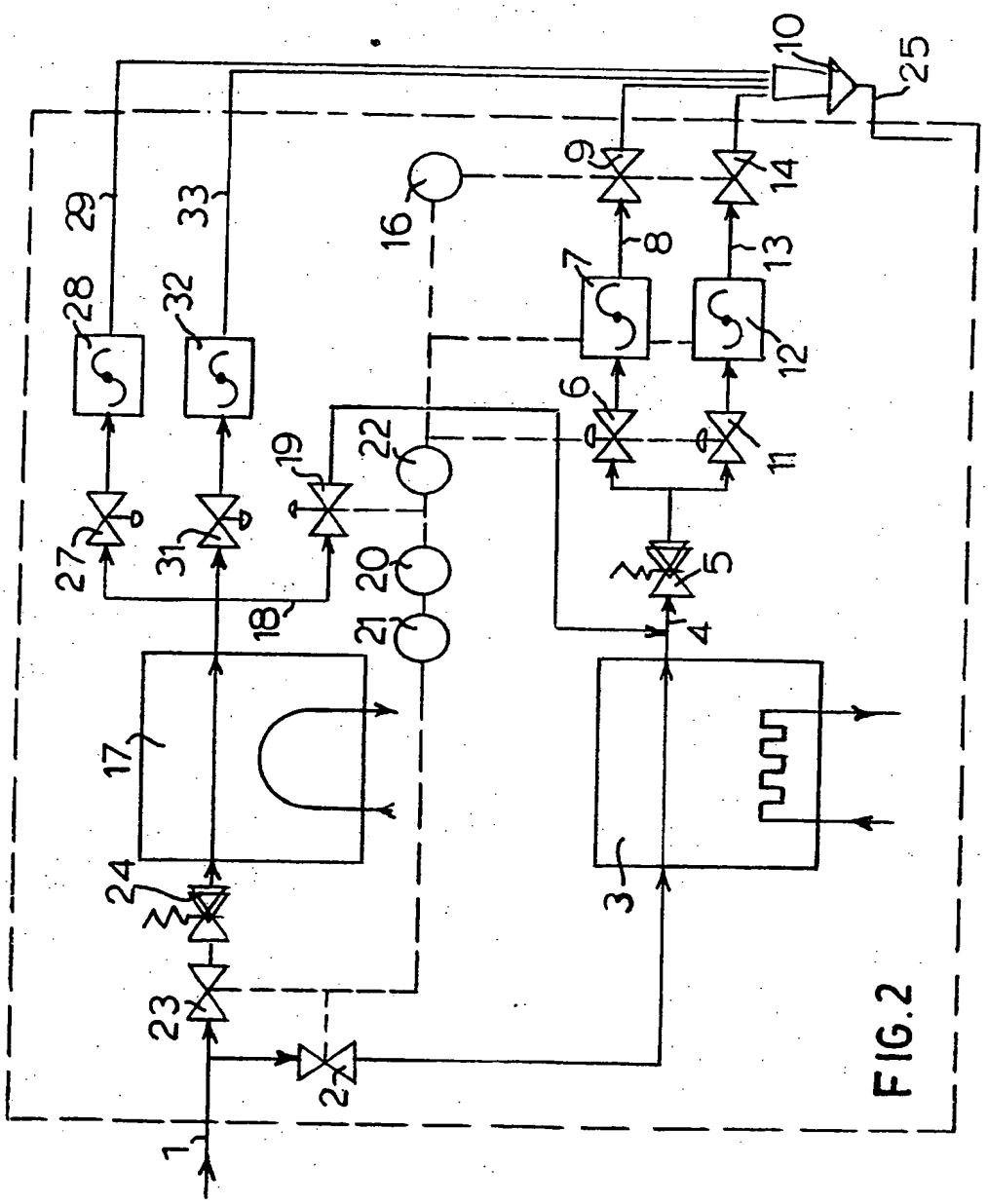

FIG.2

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SPECIFICATION

Apparatus for Delivering Measured Quantities of Beverages

The present invention relates to an apparatus for automatically delivering measured quantities of at least cooled beverages, each measured quantity of beverage being prepared just before delivering it by mixing powdered ingredients and water, said apparatus being provided with at least a cooler for drinking water and with at least one delivery line connected to the cooler, said line consisting of a control valve, a mixer and a cup holder, a quantity measuring device for powdered ingredient being connected to the mixer.

A considerable problem in apparatuses for the batchwise preparation of cold beverages from powdered basic ingredients and water and for delivery of these cold beverages, particularly milk or beverages having milk therein, is the bacteriological condition of the delivered beverage. Although good drinking water contains only a few germs, mostly less than 100 per milliliter and if one can use powdered basic ingredients of a very good bacteriological quality, the final product, after the apparatus was used for some time, will have too high a germ amount. Multiplication of germs takes place in the water measuring system at the closing valves, regulating valves, throttle valves and the like and particularly in the mixer where the growth of the germs is even stimulated by the remainders of powdered ingredients which may or may not be dissolved. Milk is subjected to requirements indicated in the Sale of Food and Drugs Act, involving that it should not contain more than 100,000 germs per milliliter. In an automatic machine for cold milk or cold beverages having milk therein this germ amount is exceeded already after a very short period of time. Therefore it is necessary to frequently and thoroughly clean and disinfect said machine, resulting in that up to now vending machines for cold milk beverages were not very attractive from an economic point of view.

The essential object of the present invention is to eliminate this disadvantage of the known vending machines. Accordingly the essential concept of the present invention involves dispensing means for cleaning and disinfecting liquid, said dispensing means being automatically connectable, via a second control valve, at a predetermined sequence of periods of time to the connecting pipe between the cooler and each of the delivery lines.

Practice has shown that by flushing four times per 24 hours with 500 cm^3 of water of 75°C as cleaning liquid, the delivered cooled milk, even if the apparatus according to the present invention is used for a long period of time, amply meets the legally set requirement for the number of germs per milliliter.

Therefore according to the invention the dispensing means for cleaning and disinfecting liquid is preferably a boiler for dispensing hot drinking water.

After being flushed with hot water, the apparatus should be cooled so that it can deliver properly cooled beverages again. Accordingly the present invented apparatus preferably comprises means for flushing said delivery lines during a predetermined period of time with water from the cooler after each of the delivery lines has been flushed during a predetermined period of time with the cleaning and disinfecting liquid.

In order to regulate the discharge from the mixer, the present invented apparatus may moreover comprise a regulating valve in the discharge pipe between the mixer and the cup holder. If this regulating valve is present the apparatus preferably comprises means for closing said regulating valve after a portion of the period of time necessary for the preparation of the predetermined quantity of beverage, has lapsed and to open the regulating valve again near the end of the said period of time after the mixer is completely filled with water. By filling the mixer completely with water it is prevented that undissolved remainders of the powdered ingredient are left in the mixer after the predetermined quantity of beverage, which is necessary to fill a cup, has been prepared.

In order to thoroughly clean the mixer during the time it is flushed with hot water from the boiler and to subsequently cool the mixer sufficiently if it is optionally flushed with cooled water from the cooler, the invented apparatus may comprise means to intermittently open and close the regulating valve during at least a portion of the period of time during which hot flush water and, optionally, subsequently cooled flush water is passed through the delivery lines.

A more efficient use of the boiler which is provided in the invented apparatus for the dispense of the hot flush water, is according to the invention possible by providing at least one delivery line for the preparation of hot beverages, said delivery line being connected to said boiler and consisting of at least a control valve, a mixer and a cup holder, and by a device for dispensing measured quantities of powdered ingredient, said device being connected to the mixer.

These and other characterizing features and advantages of the invention will be further illustrated in the following description of two possible embodiments, one of which is a possible embodiment of an automatic machine only for cooled beverages as schematically represented in fig. 1, and the other one is a possible embodiment of an automatic machine for cooled and hot beverages as schematically represented in fig. 2.

The embodiment of the automatic machine according to fig. 1 serves to mix, just before the cooled beverage is delivered, a measured quantity of powdered ingredient and a measured quantity of cooled water, the powdered ingredient consisting of one or more powdered foodstuffs. The powdered ingredient may for instance be milk

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powder to have the automatic machine prepare cooled milk.

The automatic machine according to fig. 1 is provided with a supply conduit for drinking water, said supply conduit being connected to a cooler 3 via a shut-off valve 2. From the cooler a discharge conduit 4 extends via an adjustable throttle valve 5 and a control valve 6 to a mixer 7 into which also a supply conduit (not shown in the drawing) with a valve to be opened for supplying the powder, for instance milk powder, extends. From the mixer 7 a discharge conduit 8 leads via a regulating valve 9 to a cup holder 10, which contains a removable cup to collect the prepared beverage, for instance cooled milk prepared from the drinking water supplied via the supply conduit 1, said drinking water being cooled in the cooler 3 and being mixed with milk powder in the mixer 7.

Instead of one line consisting of the control valve 6, the mixer 7 and the regulating valve 9, a number of such lines, can be present parallel to each other, for instance two lines as in the embodiment according to fig. 1, in which after the throttle valve 5 the supply conduit for cooled drinking water branches and communicates via a second control valve 11, identical to the control valve 6, also to a second mixer 12, identical to the mixer 7, and from there a second discharge conduit 13 for cooled beverage extends via a regulating valve 14, identical to the regulating valve 9, to the cup holder 10.

If both mixers each mix a different beverage, the machine is then capable to deliver different beverages.

Instead of two or more individual and parallel lines each consisting of a control valve, a mixer and a regulating valve with intermediate conduits, the presence of only one of such a line is also possible, the mixer of this single line being selectively connectable with a number of storage bunkers containing different powdered basic materials. By selectively connecting one of said storage bunkers with the mixer for supplying a quantity of powdered ingredient into the mixer it is then also possible to deliver different beverages.

The regulating valves 9 and 14 can be closed temporarily by the time mechanism 16 and furthermore according to another embodiment of the invention, they can be intermittently closed and opened during a predetermined period of time by said time mechanism.

From the drinking water supply conduit 1 a branch conduit extends via a shut-off valve 23 and a throttle valve 24 to a boiler 17 from which a hot water conduit 18 extends via an adjustable regulating valve 19 in the conduit 4 between the cooler 3 and the throttle valve 5. The shut-off valves 2 and 23 as well as the regulating valve 19 are controllable by time mechanisms 20 and 21, whereas the control valves 6 and 11 are regulable by the time mechanisms 20 and 22.

The shut-off valve 2 and the regulating valves 9 and 14 are initially opened but all other valves are closed. In order to obtain a cup of cold beverage a coin is inserted in the automatic machine so that a cup drops in the cup holder 10. After that by pushing a selector button for instance the control valve 6 is opened, whereas after a preselected period of time, for instance after eight seconds, said control valve closes again, so that during said period of time cold water flows from the cooler 3 to the mixer 7 whereas during said eight seconds also the stirrer in the mixer 7 is rotated. During a first portion of said period of time, for instance the first four of the eight seconds, also a predetermined quantity of powdered ingredient is supplied to the mixer. The mixture flows from the mixer via the opened regulating valve 9 into the cup in the cup holder 10. After the supply of powdered ingredient to the mixer is finished, for instance five seconds after the start of the eight seconds' mixing cycle, the regulating valve 9 is closed for a short period of time, for instance during three seconds, by the time mechanism 16, with as a result that the mixer 7 is substantially completely filled with cold water so that if remainders of powdered ingredient are present in the mixer, the remainders are dissolved in the water. After said three seconds the regulating valve 9 is opened again by the time mechanism 16 so that the dissolved remainders flow from the mixer to the cup with as result that the mixer is throughly free of milkpowder. This is important as milkpowder is a culture medium for bacteria in the mixer. After the said three last seconds of the eight seconds' mixing cycle have ended, the control valve 6 is also closed and the stirrer of the mixer is stopped after which the cycle can be repeated for the preparation of a next quantity of cooled beverage.

The same cycle takes place if the selector button, belonging to the second line comprising the control valve 11, the mixer 12 and the regulating valve 14, of the automatic machine is pushed.

According to a predetermined sequence, for instance once per six hours, the time mechanism 20 opens the shut-off valve 23 as well as the regulating valve 19 and the control valves 6 and 11, and closes the shut-off valve 2. Because of this hot water flows from the boiler 17 through the throttle valve 5, the control valves 6 and 11, the mixers 7 and 12, the regulating valves 9 and 14 to the cup holder 10 after which the flush water is discharged through the discharge pipe 25. This hot flush water cleans the throttle valve 5, the control valves 6 and 11, the mixers 7 and 12, the regulating valves 9 and 14. After a certain period of time, for instance 75 seconds, the time mechanism 21 closes the shut-off valve 23 and the regulating valve 19 again whereas the shut-off valve 2 is opened again, so that with the control valves 6 and 11 remaining open, cold water flows from the cooler 3 through the throttle valve 5, the control valves 6 and 11, the mixers 7 and 12 and the regulating valves 9 and 14 in order to cool these elements and the intermediate conduits again to a temperature which is necessary for the preparation of cooled beverage.

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This flow of cooled water takes for instance 15 seconds and the cold flush water is discharged via the cup holder 10 and the discharge pipe 25. During said totally 90 seconds' flush cycle the regulating valves 9 and 14 are intermittently opened and closed by the time mechanism 16, for instance opened during three seconds and followed by closing during seven seconds so that the mixers 7 and 12 during the flush operation with hot water are at least substantially filled for a certain number of times with hot water, so that they are well cleaned, whereas during the flush operation with cooled water, said mixers are cooled quickly to the temperature which is necessary for delivering cooled beverages. During the cleaning cycle the stirrers in the mixers 7 and 12 are activated by the time mechanism 20. In order to achieve a good cleaning, the boiler must dispense water with a temperature of 75°C or more. The cleaning cycle is terminated by the time mechanism 22 which closes the control valves 6 and 11 again, whereas the shut-off valve 2 and the regulating valves 9 and 14 stay open, after which the automatic machine is ready again for the delivery of cooled beverage.

As an illustration of the effectiveness of the periodical flush operation with hot water in the manner as indicated, some values of the germ amount are given which were found when using the automatic machine for cold milk as described above.

a. When using the automatic machine without hot water flush: germ amount in the water just in front of the mixer, measured 2 to 7 days after the day the automatic machine started to operate: 10^4—2×10^5 germs/milliliter. Germ amount of the milk delivered in the cup, measured 2 days after the day the automatic machine started to operate: 10^6—10^7 germs/milliliter.

b. When using the automatic machine with a flushing of 500 milliliter of hot water once per 6 hours: germ amount of the water just in front of the mixer, measured 2 to 7 days after the automatic machine started to operate: 200—5000 germs/milliliter.

Germ amount in the milk delivered in the cup, measured 2 to 7 days after the automatic machine started to operate:

average: 10,000 germs/milliliter.

maximally: 40,000 germs/milliliter.

This example shows that by using a hot water flushing once per 6 hours in the manner as described, the automatic machine may function for at least one week without being cleaned in between, whereas without said hot water flushings the germ amount of the delivered milk was raised already after two days to a multiple of the admissible value.

Moreover the boiler which is necessary for the preparation of the hot flushing water may be used in the embodiment of the automatic machine as indicated in fig. 2, for the delivery of hot beverages like hot milk or coffee. For that purpose the automatic machine is a combination of the automatic machine for cooled beverages according to fig. 1 completed with an automatic machine for the delivery of hot beverages, so that in the first place the automatic machine according to fig. 1 is present, and therefore it will not be discussed again here. The additional automatic machine for hot beverages comprises a branch conduit from the conduit 18 from the boiler 17, and said branch conduit leads via a control valve 27 to a mixer 28, into which also one or more measuring devices (not shown in the drawing) for powdered ingredients such as milk powder or a mixture of coffee powder, coffee milk powder and sugar, terminate. A discharge conduit 29 leads from the mixer 28 to a cup holder 10 with contained therein a removable cup for collecting the prepared hot beverage, for instance hot milk which is prepared by mixing hot water supplied via the conduit 18 from the boiler 17, with milk powder in the mixer 27, or hot coffee which is prepared by mixing hot water from the boiler 17 with coffee powder, coffee milk powder and sugar in the mixer 27.

Instead of one line consisting of the control valve 27 and the mixer 28, a number of such lines may be present in one and the same automatic machine, like two lines in the embodiment according to fig. 2, in which the supply conduit 18 for hot water from the boiler 17 branches and leads via a second control valve 31, identical to the control valve 27, to a second mixer 32, identical to the first mixer 28, and from there a second discharge conduit 33 for hot beverage leads to a cup holder 10.

Initially the control valves 27 and 31 are closed, the mixers 28 and 32 are empty and their stirrers stand still, and also the valves in the supply conduits for powder to the mixers are closed. In order to obtain a cup of hot beverage a coin is inserted in the automatic machine, resulting in that a cup drops in the cup holder 10. Then by pushing a selector button the shut-off valve 23 and the control valve 27 are opened and after a predetermined period of time, for instance after eight seconds, both valves are closed again so that during said period of time hot water flows from the boiler 17 to the mixer 28, whereas during said eight seconds also the stirrer in the mixer is rotated. During a first portion of said period of time, for instance during the first four of the said eight seconds, also a predetermined quantity of the powder is supplied into the mixer. The mixture flows from the mixer into the cup in the cup holder 10. After the supply of powdered ingredient has ended, the supply of hot water is proceeded during four seconds more so as to dissolve remainders of powdered ingredients in the mixer and to discharge these remainders to the cup. After this the line is ready again for the delivery of a next measured quantity of hot beverage.

The same cycle takes place when the selector, regarding the control valve 31 and the mixer 32 is pushed.

In the present specification the construction of the shut-off valves, throttle valves, boiler, cooler,

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regulating valves, time mechanisms, mixers, control valves, supply mechanisms for powdered ingredient and cups, coin inserting mechanism, mechanisms to render determined lines of the automatic machine operative by means of selector buttons and other auxiliary means and auxiliary devices are not described as said components are no part of the essence of the invention and may moreover be known per se.

Claims

1. Apparatus for automatically delivering measured quantities of at least cooled beverages, each measured quantity of beverage being prepared just before delivering it by mixing powdered ingredients and water, said apparatus being provided with at least a cooler for drinking water and with at least one delivery line connected to the cooler, said line consisting of a control valve, a mixer and a cup holder, a quantity measuring device for powdered ingredient being connected to the mixer, characterized by dispensing means for cleaning and disinfecting liquid, said dispensing means being automatically connectable, via a second control valve, at a predetermined sequence of periods of time to the connecting pipe between the cooler and each of the delivery lines.

2. An apparatus according to claim 1, characterized in that said dispensing means for cleaning and disinfecting liquid is a boiler for dispensing hot drinking water.

3. An apparatus according to claim 1 or 2, characterized by means for flushing said delivery lines during a predetermined period of time with water from the cooler after each of the delivery lines has been flushed during a predetermined period of time with the cleaning and disinfecting liquid.

4. An apparatus according to any of the preceding claims, characterized by a regulating valve in the discharge pipe between the mixer and the cup holder.

5. An apparatus according to claim 4, characterized by means for closing said regulating valve after a portion of the period of time necessary for the preparation of the predetermined quantity of beverage, has lapsed and to open the regulating valve again near the end of the said period of time after the mixer is completely filled with water.

6. An apparatus according to claim 3 and 4, characterized by means to intermittently open and close the regulating valve during at least a portion of the period of time during which hot flush water and, optionally, subsequently cooled flush water is passed through the delivery lines.

7. An apparatus according to any of claims 2 thru 6, characterized by at least one delivery line for the preparation of hot beverages, said delivery line being connected to said boiler and consisting of at least a control valve, a mixer and a cup holder, and by a device for dispensing measured quantities of powdered ingredient, said device being connected to the mixer.

8. Apparatus for automatically delivering measured quantities of at least cooled beverages, substantially as herein described and with references to the accompanying drawings.

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